

PATENT COOPERATION TREATY



PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Translation
 O I P E
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 PATENT

Applicant's or agent's file reference BIF023239/DM	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/FR2003/003256	International filing date (day/month/year) 31 octobre 2003 (31.10.2003)	Priority date (day/month/year) 07 novembre 2002 (07.11.2002)
International Patent Classification (IPC) or national classification and IPC H01L 21/762, 21/265		
Applicant COMMISSARIAT A L'ENERGIE ATOMIQUE		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 25 mars 2004 (25.03.2004)	Date of completion of this report 14 February 2005 (14.02.2005)
Name and mailing address of the IPEA/EP	Authorized officer
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I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

- ☐ the international application as originally filed.
- ☒ the description, pages 1-16, as originally filed,
 pages _____, filed with the demand,
 pages _____, filed with the letter of _____,
 pages _____, filed with the letter of _____.
- ☒ the claims, Nos. 1-18, as originally filed,
 Nos. _____, as amended under Article 19,
 Nos. _____, filed with the demand,
 Nos. _____, filed with the letter of _____,
 Nos. _____, filed with the letter of _____.
- ☒ the drawings, sheets/fig 1/3-3/3, as originally filed,
 sheets/fig _____, filed with the demand,
 sheets/fig _____, filed with the letter of _____,
 sheets/fig _____, filed with the letter of _____.

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/fig _____

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

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V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-8	YES
	Claims		NO
Inventive step (IS)	Claims	1-8	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-8	YES
	Claims		NO

2. Citations and explanations

1. Reference is made to the following documents:

- D1: AGARWAL A ET AL: "EFFICIENT PRODUCTION OF SILICON-ON-INSULATOR FILMS BY CO-IMPLANTATION OF HE+ WITH H+" APPLIED PHYSICS LETTERS, AMERICAN INSTITUTE OF PHYSICS. NEW YORK, US, vol. 72, no. 9, 2 March 1998, pages 1086-1088, XP000742819 ISSN: 0003-6951
- D2: FR-A-2 774 510 (S O I TEC SILICON ON INSULATOR) 6 August 1999
- D3: US-A-6 150 239 (TONG QIN-YI ET AL) 21 November 2000

2. The present application meets the requirements of PCT Article 33(1) since the subject matter of claims 1 and 17 meets the novelty and inventive step requirements (PCT Article 33(2) and (3)).

2.1 D1, which is considered the prior art document closest to the subject matter of claims 1 and 17, describes (the references in brackets are to that document):

- "principal" implantation in a substrate (see abstract, implantation of H);
- "secondary" implantation in the substrate, with a higher concentration than that of the "principal" species (see

abstract, implantation of He); and

- the triggering of the fracture along the "principal" depth (see page 1088, left-hand column, lines 15 to 19).

2.2 Therefore the subject matter of claims 1 and 17 differs from this known method and thin layer in that D1 does not describe the following features:

- "secondary" implantation to a "secondary" **depth different** from the "principal" depth;
- the "secondary" chemical species which is **less efficient** than the "principal" species **for embrittling the substrate**; and
- the **migration** of at least some of the "secondary" species to the vicinity of the "principal" depth.

2.3 Therefore the subject matter of claims 1 and 17 is **novel (PCT Article 33(2))**.

2.4 The problem addressed by the present invention can thus be considered that of obtaining a relatively thin embrittled area using a small number of implantations.

2.5 For the following reasons, the solution to this problem proposed in claims 1 and 17 of the present application is considered to involve an inventive step (PCT Article 33(3)):

None of the international search report citations suggests to a person skilled in the art that all the features of claims 1 and 17 be applied.

Although D2 and D3 describe a "principal" implantation and a "secondary" implantation in a substrate (D2: figure 4; D3: column 10, lines 8 to 38), D2 does not describe

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different levels of efficiency for embrittling the substrate since, in that document, the implanted elements are of the same type; and D3 does not describe the two elements being implanted to different depths.

It is not considered obvious for a person skilled in the art to combine the features known from D1, D2 and D3 and thus arrive at a method or thin layer as per claims 1 and 17.

2.6 Claims 1 and 17 of the present application are thus considered to involve an inventive step (PCT Article 33(3)).

3. Claims 2 to 16 are dependent on claim 1 and claim 18 is dependent on claim 17. Therefore these claims likewise meet the PCT novelty and inventive step requirements (PCT Article 33(2) and (3)).

4. The subject matter of claims 1 to 18 meets the requirements of PCT Article 33(4).